

High Efficiency Lighting with Integrated Adaptive Control (HELIAC), Phase I

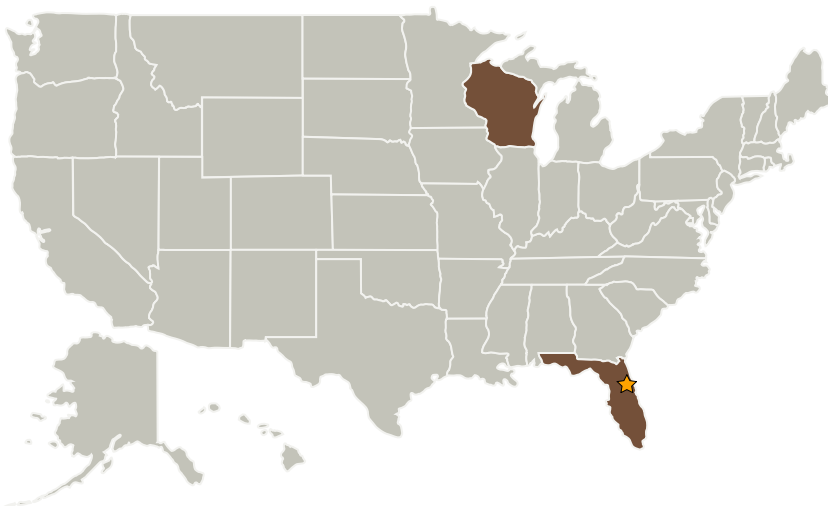
Completed Technology Project (2005 - 2005)



Project Introduction

The innovation of the proposed project is the development of High Efficiency Lighting with Integrated Adaptive Control (HELIAC) systems to drive plant growth. Solar radiation is not a viable option for growing plants on the moon or on Mars for multiple reasons. On the other hand, lighting plants with electric lamps and rejecting the associated waste heat has energy costs that have driven NASA toward other options to provide food and fresh air to future Mars crews. The solution offered by this project improves upon the efficiency of a novel new light-distribution technology involving low-power, solid-state sources that emit specific-wavelength photons to match plant photoreceptors. The HELIAC lighting system consists of small individual "light engines" that provide a level of control precision far in excess of standard lamps. This precision enables lamp configuration to be adapted to species specific growth habits so that photons can be absorbed efficiently by all available photosynthetic tissues. HELIAC will also provide the capability to adapt spectral balance automatically to plant development stage. Finally, it will have the capability to automatically detect the proximity of plant tissue and power only adjacent light engines, thereby greatly decreasing power requirements, particularly during early plant development.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Orbital Technologies Corporation	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Madison, Wisconsin

Primary U.S. Work Locations

Florida	Wisconsin
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Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Jeffery Emmerich

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.5 Food Production, Processing, and Preservation